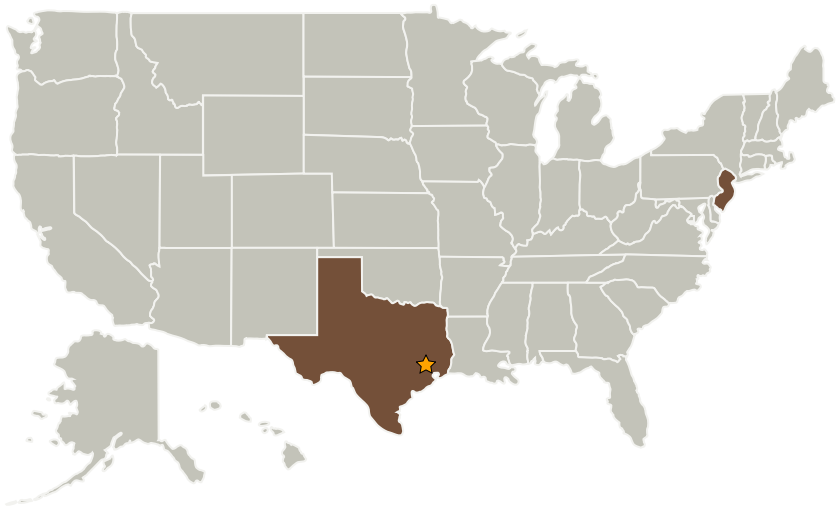
In Situ Training of Robonaut for In-Space Assembly, Maintenance and Servicing, Phase I

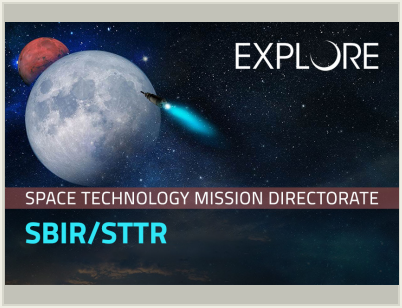
Completed Technology Project (2005 - 2005)

Project Introduction

The goal of the proposed FieldTrainer control system is to enable astronauts to teach Robonaut on-orbit how to perform new complex tasks using EVA tools. Employing a show-and-tell approach to robot training, the control system acquires rule-based task plans through verbal dialog between robot and astronaut, and acquires neural network-based skills incrementally though verbal, visual, and manual inputs. The project builds upon previous research that demonstrates the viability of verbally constructing non-trivial task descriptions. In Phase I, a simulator for a Robonaut-based Hubble rescue mission is developed. Baseline tool manipulation behaviors are created using an existing behavior development system. Verbal construction of high-level rule-based behaviors is demonstrated. Refinement of motion sequences through verbal training of neural networks is studied whereby perturbations are added to nominal rule-based task execution. The training methodology is also evaluated for its potential use in education. FieldTrainer technology is expected to give Robonaut an unending ability to learn and flightcrews the ability to customize Robonaut's behavior for routine tasks and unexpected situations.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Completed Technology Project (2005 - 2005)

Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
American Android Corp.	Supporting Organization	Industry	Princeton, New Jersey

Primary U.S. Work Locations	
New Jersey	Texas

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

David Handelman

Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.3 Mission Operations and Safety
    - TX07.3.3 Training